

REMARKS

Claims 50-58 are pending In the subject application. In the Office Action, claims 50-58 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 5,891,522 issued to Olson ("Olson") or by U. S. Patent No. 5,700,518 issued to Lee et al ("Lee"). Claims 50-58 were also rejected under 35 U.S.C. § 102(b) as being anticipated by U. S. Patent No. 5,560,839 issued to Bennett et al. ("Bennett") or by U. S. Patent No. 5,415,674 issued to Feisrtritzer et al. ("Feisrtritzer") or by U. S. Patent No. 5,380,408 issued to Svensson ("Svensson") or U. S. Patent Nos. 5,567,526 or 5,236,740 issued to Peters ("Peters").

Applicants herein amend claim 50 without narrowing the claim scope. A copy of claim 50 showing the changes made herein is attached, wherein additions to the claims are shown underlined, and deletions are shown bracketed. Applicants herein submit the following remarks and arguments to overcome the rejections.

Claim Rejections under 35 U.S.C. § 102

Claims 50-58 are rejected under 35 U.S.C. § 102 as being anticipated by various issued patents. The Examiner states that the cited prior art "discloses the claimed protective coating on the claimed substrate." Applicants respectfully disagree that the disclosure of the cited patents anticipate the product claims of the subject application, and request reconsideration of all of the presently rejected claims. The claimed article of the subject application comprises additional limitations than just a protective coating and a substrate.

The claims of the subject application are directed to an article, comprising a composite portion comprising carbide particles in a binder, an etched surface portion

substantially free of eta phase, the etched surface portion comprising unetched carbide particles and voids between the unetched carbide particles, wherein the voids extend to the composite portion, and a wear resistant coating on the etched surface portion and disposed in the voids. None of the references cited by the Examiner disclose an article comprising all of the elements of independent claim 50 nor claims 51-58 dependent therefrom .

Additionally, the Examiner states in the Office Action that "Applicant's arguments filed 6-13-2001 have been fully considered but they are not persuasive. The Applicant argues that the process by which the product is made is different rendering the product different. The applicant is reminded that an invention defined in a product by process claim is a product, not a process." Applicants respectfully submit that the Examiner is incorrect in the conclusion that the present claims of the subject application are product-by-process claims. The present claims of the subject application, as amended with the Request for Continued Examination filed on January 24, 2002, are simply product claims. A product-by-process claim "is a product claim that defines the claimed product in terms of the process by which it is made." See Manual of Patent Examining Procedure ("MPEP"), §2173.05, *citing In re Moeller*, 117 F.2d 565, 48 USPQ 542 (CCPA 1941); *In re Luck*, 476 F.2d 650, 117 USPQ 523 (CCPA 1971); *In re Stepan*, 394 F.2d 1013, 156 USPQ 143 (CCPA 1967) and *In re Pilkington*, 411 F.2d 1345, 162 USPQ 145 (CCPA 1969). The claims of the subject application do not define the product in terms of the process by which it is made. The claims of the subject application define the product in terms of the structure of the article. All of the structural

limitations of the claimed article are not included is a single reference of record in the subject application.

The pending claims in the subject application stand rejected based on seven references, which in the Examiner's opinion anticipate the pending claims under either 35 U.S.C. § 102 (b) or (e). However, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Id* at § 2131. Applicant respectfully submit that these references disclose patently distinct articles and do not disclosed each and every element as set forth in the claim. The references may disclose a substrate and a coating, however, the structure of the articles in the references are different than the claimed article. Applicants herein discuss these structural differences. All citations refer to the prior art reference unless otherwise stated.

U. S. Patent No. 5,891,522 issued to Olson

Olson discloses a process for coating a tungsten carbide base material substrate with CVD diamond film including the carburization and gas-assisted vaporization of cobalt from the surface with simultaneous recrystallization of surface grains of tungsten carbide to change their stoichiometry for improved adherence. See *Abstract*. The disclosure of Olson specifically distinguishes the surface structure of the Olson product from the product claimed in the subject application. As disclosed at column 3, lines 54-56, Olson teaches, "However, unlike techniques which remove the binder phase to some depth below the exposed WC-Co substrate surface, binder phase removal is done in a way which limits removal to only an area directly exposed to the CVD growth species, herein referred to as the 'free surface.' The phase composition of

the WC phase is controlled to maximize the density of direct chemical bonding between the diamond film and the substrate.”

The process of Olson is said to “a) vaporize the free surface binder phase, b) induce growth of the WC grains at the free surface, and c) shift the stoichiometry [sic] of the free surface WC phase to a carbon deficient ratio without formation of the of the [sic] brittle eta phase of WC (M_6C , $M_{12}C$).” *See column 4, lines 24 - 31.* This process promotes the recrystallization and grain growth of WC at the surface of the substrate. *See column 5, lines 2 - 3.* The recrystallization and grain growth of the WC provides a free surface free of binder in order to enhance the chemical interaction of the CVD coating and the WC. The process of Olson produces a free surface of the substrate “essentially free of the cobalt binder phase.” *See column 4, lines 40-41, column 5, lines 52-53 and column 6, 20-21.*

The claims of the subject application describe voids between the unetched carbide particles which extend to the composite region which comprises a binder. Due to the surface evaporation of the binder and the recrystallization of the WC phase to eliminate voids, the product of Olson does not comprise an etched surface portion comprising voids between the unetched carbide particles. The article described in Olson does not include each and every element as set forth in the claim.

U. S. Patent No. 5,700,518 issued to Lee et al.

Lee discloses a method of producing a coated composite material substrate that comprises first etching of the hard constituent of the composite material by an electrolytic etching process or a liquid chemical etching. *See column 2, lines 45 - 59.* In a cemented carbide object, this method produces a substrate wherein the

“carbide phase of the cemented carbide is irregularly etched”. See *column 2, lines 62 - 66*. Subsequently, the substrate is further etched “resulting in the removal of the cobalt binder phase”. See *column 3, lines 3 - 6*.

As set forth in the claims, the claimed article comprises unetched carbide particles. The article described in Lee does not include a surface portion comprising unetched carbide particles, and therefore, does not include each and every element as set forth in the claim.

U. S. Patent No. 5,560,839 issued to Bennett et al.

Bennett discloses a method of producing a coated composite material substrate that comprises a first etching of the binder material and a second etching to remove the tungsten carbide to a desired depth. See *column 5, lines 21-28*.

As described above, the claimed article of the subject application comprises unetched carbide particles in an etched surface portion. The article disclosed in Bennett does not comprise unetched carbide particles and, therefore, does not include each and every element as set forth in the claim.

U. S. Patent No. 5,415,674 issued to Feisrtritzer et al.

Feisrtritzer discloses a method of producing a coated composite material substrate that comprises creating at the substrate surface, via the presence of dissociated hydrogen, conditions resulting in the thermal evaporation of binder metal. This thermal evaporation of the binder material creates temperatures at the surface of the substrate of “about 3000°C. However, diffusion and phase changes in cemented materials can no longer be neglected from temperatures of 900° and above.” See *column 4, lines 38-39*. The high temperature at the surface results in “recrystallizing, in

addition to and simultaneously with the evaporation of binder metal, the hard material remaining in the boundary zone whereby the substrate surface is restructured and roughened." *See column 3, lines 18-21.*

The Feisrtritzer thermal process of evaporation had recrystallization results in a "closed, roughened hard material surface structure." *See column 4, lines 25-26.* This surface structure is distinct from the surface structure of the claimed article. The claimed article comprises an etched surface portion comprising voids extending to the unetched region. The article of Feisrtritzer is a closed surface structure of hard material which does not comprise voids extending to the unetched portion and, therefore, does not include each and every element as set forth in the claim.

U. S. Patent No. 5,380,408 issued to Svensson

Svensson discloses a method of producing a coated composite material substrate that has been processed so that the "cobalt layer on the surface will be effectively removed whereas the cobalt in the channels between the hard material grains will not be etched away. The binder phase layers between the carbide grains, which are necessary for the strength of the cemented carbide are not affected." *See column 2, lines 39-45.*

The method and resultant product of Svensson produces the opposite result and structure of the claimed article of the subject application. As discussed above, the claimed article of the subject application comprises an etched surface portion comprising voids between the unetched carbide particles. The product described in Svensson does not include these voids and actually teaches away from creating these voids. *See column 2, lines 43-45.* The claimed article comprises a

protective coating disposed in the voids. Obviously, if the product of Svensson does not include voids, a protective coating may not be disposed in the voids. The article described in Svensson does not include each and every element as set forth in the claim.


U. S. Patents No. 5,567,526 and 5,236,724 issued to Peters et al.

Peters discloses a method of producing a coated composite material substrate that has a surface layer of hard constituent removed and only some of the binder material removed. *See column 3, lines 23-41.* Peters describes a process that is said to increase the adhesion of an applied coating to a composite material substrate by removal of the surface carbide, or hard constituent material. The process of Peters comprises two etching steps. The first etch "removes a small amount of the tungsten carbide at the surface of the substrate while leaving the cobalt binder substantially intact. The substrate is then subjected to a process which removes any residue remaining on the surface as a result of the performance of the process which removes the tungsten carbide." *See column 2, lines 57-62.* The primary purpose of this process appears to be the etching of the tungsten carbide and removal of the residue of this process. A by-product of the Peters process is the removal of "some" of the binder material. The substrate produced by the method of the subject application is patently distinct from the substrate produced by the process of Peters. The claimed article of the subject application comprises an etched surface portion comprising unetched carbide particles and voids between the unetched carbide particles. The carbide particles of Peters are etched. The article described in Peters does not include each and every element as set forth in the claim.

CONCLUSION

For the reasons discussed above, none of the cited references describe each and every element of the article of claims 50-58. Accordingly, withdrawal of the rejection under 35 U.S.C. § 102 for each reference and reconsideration of these claims is respectfully requested. Furthermore, it is asserted that based on the clear distinctions between the claims of the subject application and the references set forth above, no reference cited by the Examiner suggests the claimed article. Accordingly, it is respectfully submitted that the claims of the subject application cannot be said to be rendered obvious by the teachings of the cited references in any combination. In view of the foregoing amendments, Applicants respectfully submit that the subject application is in condition for allowance. Such action at an early date is respectfully requested. Should the Examiner have any remaining concerns regarding the application's claims, he is requested to contact the undersigned at the telephone number below so that those concerns may be addressed in an interview with the Examiner.

Respectfully submitted,



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VERSION OF CLAIMS INDICATING AMENDMENTS MADE

(Amended) An article, comprising

a[n] composite portion comprising carbide particles in a binder;

an etched surface portion substantially free of eta phase, the etched surface portion comprising unetched carbide particles and voids between the unetched carbide particles, wherein the voids extend to the [unetched region] composite portion;

and

a wear resistant coating on the etched surface portion and disposed in the voids.

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